

ART. X.—*Contributions to the Palaeontology of the  
Older Tertiary of Victoria.*

GASTROPODA.—PART II.

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(With Plates XVIII. and XIX.).

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In this paper I desire to add to our knowledge of the molluscan fauna of the Older Tertiary deposits by the description and figures of several new species of interest, together with notes, additions, and corrections on species that have previously been described.

The species referred to in the following pages are as follows :

*Clavella bulbodes*, Tate.  
*Clavella platystropha*, sp. nov.  
*Columbella balcombensis*, sp. nov.  
*Columbella approximans*, sp. nov.  
*Columbella woodsi*, nom. mut.  
*Pleurotoma selwyni*, sp. nov.  
*Apiotoma bassi*, sp. nov.  
*Turbo hamiltōnensis*, sp. nov.  
*Collonia geelongensis*, sp. nov.  
*Collonia otwayensis*, sp. nov.  
*Cantharidus serratulus*, sp. nov.  
*Astele millegranosa*, sp. nov.  
*Eutrochus fontinalis*, sp. nov.  
*Bankivia howitti*, sp. nov.  
*Pleurotoma murayana*, sp. nov.  
*Pleurotoma granti*, sp. nov.

***Clavella bulbodes***, Tate. (Pl. XVIII., Figs. 2, 3.)

1888. *Fusus bulbodes*, Tate. T.R.S.S.A., vol. x., Gast.,  
pt. i., pp. 139, 140 (pp. 49, 50, in reprint),  
pl. 7, f. 8.

1892. *Fusus bulbodes*, Pritchard. Cat. Tert. Foss. Austr., S.A. School of Mines Report, p 195 (p. 27 in reprint).
1894. *Clavilithes bulbodes*, Tate. P.R.S. N.S.W., vol. xxviii., p. 170.
1901. *Clavella bulbodes*, Pritchard. P.R.S. Vic., vol. xiv., n.s., pt. i, p. 48.

Description.—This species was founded on young specimens, and judging from the localities originally indicated by Professor Tate, it seems that two species have on this account been confused. For the usual specimens from Muddy Creek appear to me to represent quite a distinct species from that obtainable at Mornington and several other localities, though I possess one imperfect example of this species from Muddy Creek, and I therefore judge it as comparatively rare.

Professor Tate's description runs as follows:—"Shell long, fusiform with a rapidly narrowing spire of subimbricating whorls, terminating in a large ovoid summit. Whorls eight, the first somewhat globose, the next very narrow, smooth and bicarinated, the third nearly flat, shining and spirally scratched; the other whorls gradually becoming more and more obtusely angled and swollen round the anterior part, being very contracted at the anterior suture, and flatly sloping to the posterior suture; encircled with raised threads (about 15 on the penultimate whorl) narrower than the interspaces, which are traversed by close-set striae. Last whorl tumid and rounded at the periphery, rapidly contracted at the base into a long, narrow, straight canal; the surface tessellated by transverse threads and stouter spiral lirae."

As these particulars and the figure given agree with the fairly common Mornington or Schnapper Point specimens, I intend to retain the name of *Clavella bulbodes* for this species, but as the dimensions show only young specimens a few further remarks on the adult specimens may not be out of place.

Shell large and strong, composed of nine rapidly enlarging spire-whorls without the remarkably large mammillate embryo, the spiral sculpture is distinctly developed on the first five whorls, but tends to become obsolete on the penultimate and body whorls, the body whorl usually only showing the mere

trace of five or six broadly separated spiral threads where the whorl has its greatest convexity; the transverse folds parallel to the lines of growth on the other hand increase in strength and irregularity till on the base of the body-whorl the whole surface is broken up by prominent undulations or growth folds of varying strength, the base shows no spiral sculpture or striations. The body-whorl falls away very rapidly to a long, straight, robust canal. Suture of penultimate and body-whorls somewhat canaliculate, outer lip slightly ascending on the body-whorl and much thickened at its junction where there is a strong enamel pad of the posterior portion of the inner lip, the enamel of the inner lip spreads well down and thins out to the columella and is strongly margined by a groove at its outer edge. In general aspect the adult retains the habit of the young shell.

Dimensions.—Length without the embryonic whorls, 200 mm.; estimated perfect length, about 210 mm.; breadth, 84 mm.; length of aperture, 56 mm.; breadth of aperture, 32 mm.; length of aperture and canal, 116 mm.

Locality.—Clays of the Old Cement Works, Balcombe's Bay, Clays of Grice's Creek and Coast sections, Mornington. Coast section Gellibrand River; Clays of the Newport shaft; Clays of Orphanage Hill, near Geelong, and Murghebuloc, Barwon River; Lower Beds of Muddy Creek.—Balcombian.—Eocene.

### *Clavella platystropha*, sp. nov. (Pl. XVIII., Figs. 4, 5).

Description.—Shell large, elongate fusiform, with an elongate spire composed of rather flattened whorls with a much elongated slender columella and canal.

Spire whorls nine in the adult form without the mammillate embryo. The first two spire whorls flat, the third slightly convex below the middle, the fourth and fifth with increasing submedian convexity, posterior slope long and gradual and flattened or slightly concave to the suture, slope to the anterior suture rather more sudden, the remaining spire-whorls flattened or only slightly but regularly convex. Body-whorl flatly convex to the periphery, thence falling away very rapidly to the snout. On the first spire-whorls the sculpture is very faint, on the

second, third, and fourth, fine uniform spiral threads narrower than the interspaces make their appearance, on the fifth the threads open out somewhat and show some finer intercalated threads especially about the median portion of the whorl, thence the spiral sculpture tends to become obsolete, the sixth whorl showing it more especially towards the posterior suture, thence it is difficult to discern any but the merest traces of spiral sculpture. The earlier whorls, especially the third and fourth, show under a lens very fine, regular close-set striae of growth, distinct in the interspaces, a few increasing in strength on the fourth so as to cross the spiral threads with a slight node and giving rise to a minute tessellation with three or four finer striae in the interspaces, thence these stronger transverse threads develop into irregular folds of growth, whilst the finer transverse ornament is probably still retained to some extent in the finer lines of growth. Suture overlapping somewhat in the earlier whorls, but developing to a strongly canaliculate suture on the body-whorl. Aperture ovate, outer lip much thickened towards the posterior suture, thinning out and becoming sharp at the edge towards the canal. Columella long, rapidly tapering and straight, but for a thickening at the posterior end of the canal, in young specimens there are two slight undulations in the length of the columella, canal long and narrow.

Dimensions.—Length of a nearly complete adult specimen, 200 mm.; estimated length perfect, 215 mm.; breadth, 80 mm.; length of aperture, 65 mm.; breadth of aperture, 33 mm.; length of aperture and canal, 133 mm. A young specimen of five whorls gives, length, 65 mm.; breadth, 17 mm.; length of aperture, 13 mm.; breadth of aperture, 7 mm.; length of aperture and canal, 45 mm..

Locality.—Lower Beds of Muddy Creek sections near Hamilton, Western Victoria.—Balcombian.—Eocene.

This species is also represented in the National Museum Collection, Melbourne, by some specimens preserved in gypsum from the River Murray Cliffs.

Observations.—This is another very fine example of the genus *Clavella*, and is specifically distinct from *C. bulbodes*, Tate. The present species, though of something like the same propor-

tions of length to breadth as *C. bulbodes*, Tate, has an entirely different habit, the whorls being flattish and running right up to the suture, instead of being tumidly convex submedially and concave towards the suture, the suture is more canaliculate, the canal is longer and of a more tapering habit, the sculpture is much finer and becomes obsolete sooner. The general habit of this species is very much more of the type of *C. longaevus* than any other described Australian species.

***Columbella balcombensis*, sp. nov.** (Pl. XVIII.,  
Figs. 10, 11).

Description.—Shell small, tumidly fusiform, with a blunt apex of about three smooth shining and somewhat tumid embryonic whorls, the extreme tip inclined to be elevated. Embryonic whorls succeeded by three to five slightly convex spire-whorls, suture impressed, and the body-whorl rather attenuate towards the snout. The smooth embryo is in strong contrast to the highly sculptured whorls, and ends off abruptly against the spire ornament. The sculpture of the spire-whorls consists of fine close costulae and rather finer spiral threads which show most strongly in the interspaces between the costulae giving rise to a minute clathrate appearance, the spiral threads increase in strength towards the anterior of the shell, being most prominent on the anterior slope of the body-whorl and on the snout. The costulae on the penultimate whorl number about thirty-five to forty. Aperture ovate; canal very short and slightly bent to the right: outer lip varicosely thickened and liriate externally, bevelled off internally to a thin edge, fairly strongly denticulate within, the strongest and largest denticle being at the anterior end of the aperture; inner lip smooth and enamelled, columella somewhat twisted.

Dimensions.—Length of a four-whorled specimen, 9 mm.; breadth, 4 mm.; length of aperture and canal, 4.5 mm.; other specimens range 7.5 mm. by 3 mm.; 7 by 3 and 5.5 by 2.5; while a five-whorled specimen extends to length, 11.5 mm.; breadth, 5 m.m.

Locality.—Clays of the old Cement Works, Balcombe's Bay (Type), Grice's Creek and Coast sections, Mornington; sandy

clays and clays of Orphanage Hill, near Geelong, and along the Lower Moorabool Valley; Curlewis clays, and Belmont, near Geelong; Newport shaft; Murgheboluc, Barwon River; Inverleigh; Shelford; Lower Beds of Muddy Creek, near Hamilton, Western Victoria; clays of the coastal sections Gellibrand River.—Balcombian (except Curlewis and Belmont.—Barwonian).—Eocene.

Clays of the middle zone of the Spring Creek series, Bird Rock Bluff, near Geelong.—Jan Jukian.—Eocene.

Observations.—This is a well marked and characteristic little species entirely different from any other of our described species, and has been frequently quoted as *C. clathrata*, Tate, but as that name was never more than a manuscript one and as it has already been several times preoccupied for both recent and fossil species of this genus, the necessity for a new name is obvious.

***Columbella approximans*, sp. nov.** (Pl. XVIII.,

Figs. 12, 13).

Description.—Of similar habit to the foregoing species, *C. balcombensis*, with a slightly exsert tip to the three smooth embryonic whorls succeeded by four other whorls, it differs strongly in its sculpture, bearing fewer bowed or backwardly curved costulae with very faint spiral lineations except towards the extreme anterior of the body-whorl. There are about thirteen costulae on the first whorl increasing to about twenty-two on the penultimate whorl. Outer lip strongly evaricose, and externally much more finely lirate than *C. balcombensis*, canal and columella also shorter. The contrast between the stronger development of the costulae and the weaker development of the spiral sculpture loses entirely for this species the clathrate appearance so characteristic of the foregoing.

Dimensions.—Length, 7 mm.; breadth, 3 mm.; length of aperture and canal, 3 mm.

Locality.—Clays of the Old Cement Works, Balcombe's Bay, Mornington.—Balcombian—Eocene. Also Curlewis, near Geelong.—Barwonian.—Eocene.

**Columbella woodsi**, nom. mut.

1878. *Fusus funiculatus*, T. Woods (non Reeve and others). P.L.S. N.S.W., p. 225, pl. 20, f. 1.
1888. *Columbella funiculata*, Tate. T.R.S. S.A., vol. x., Gast., pt. i., p. 132 (p. 42 in reprint).
1892. *Columbella funiculata*, Pritchard. Cat. Tert. Foss. Austr. Report S.A. School of Mines, p. 199 (p. 31 in reprint).
1903. *Columbella funiculata*, Dennant and Kitson. Cat. Cain. Foss. Aust., Rec. Geo. Surv. Vict., vol. i., pt. 2, p. 105.

Locality.—Clays of Orphanage Hill, Fyansford, Griffin's section, Moorabool Valley, and Curlewis near Geelong; clays and limestones of the Old Cement Works, Balcombe's Bay, Mornington, and Grice's Creek; Newport shaft; lower beds of Muddy Creek, near Hamilton, Western Victoria; Fishing Point, Aire River; Native Hut Creek and Shelford, near Inverleigh; clays of the coastal section, Gellibrand River.—Balcombian—Eocene.

Observations.—In the course of studying some of the species of this genus, I find that *Columbella funiculata*, T. Woods, originally described in the Proceedings of the Linnean Society of New South Wales, 1878, p. 225, pl. 20, f. 1, as *Fusus funiculatus* requires renaming on account of the preoccupation of this name by Reeve in 1846 and again by M. Souverbie in 1865.

This species has also appeared in several locality lists of fossils under the name of *Columbella funiculatus*, T. Woods, published both in South Australia and in Victoria.

**Pleurotoma selwyni**, sp. nov. (Pl. XIX., Fig. 1).

Description.—Shell tumidly fusiform or biconic, of medium size and build, with a comparatively broad body-whorl rapidly tapering to a very acute spire, with an aperture only slightly less than half the length of the shell, and a well-marked sinus on the keel. Embryo small, smooth, with an obtuse nucleus composed of about two whorls gradually merging into the spire-whorls. Spire-whorls eight, with a somewhat irregular and ascending overlap, giving rise to a canaliculate suture. Whorls

convex and furnished medially with two spiral lirae which mark exactly the position of the sinus; a third spiral thread is usually visible just above the anterior suture, and a fourth weak one just below the posterior suture on the earlier spire whorls, while a fifth makes its appearance on the penultimate and antepenultimate whorls and the posterior sutural thread becomes stronger; on the body-whorl below the sinus threads there are eight or nine stronger spiral lirae, and the space between the suture and the keel is strongly concave. The whole shell surface is finely spirally striate, the striae tending to be slightly undulatory owing to irregularities of growth, and increasing in strength towards the anterior of the shell. The spiral sculpture is crossed transversely by sinuated growth lines and striae of unequal strength. Sinus broad and deep, and distinctly margined by the lirae forming the keel. Aperture large, pyriform, and extending to a short, broad, open, slightly bent canal; outer lip thin and strongly arched at the middle, crenulate internally in conformity with the stronger spiral threads; columella margin smooth and slightly enamelled.

Dimensions.—Length, 38 mm.; breadth of body-whorl, 17 mm.; length of aperture, 19 mm.; breadth of aperture, 7 mm.; breadth of canal, 3 mm.; length of canal, about 5 mm. Smaller specimens range—length 28, breadth 14, 27 by 13, and 25 by 12.5.

Locality.—Lower beds of Muddy Creek, near Hamilton, Western Victoria; clays of the Old Cement Works, Balcombe's Bay, Mornington.—Balcombian.—Eocene.

Observations.—The placing of this species in *Pleurotoma* might at first sight be questioned, but it agrees more closely with this genus than any other; its characters place it in the same group as *Pleurotoma septemlirata*, Harris, which originally had the manuscript name of *Pleurotoma perarata* by Professor Tate, and is quoted under that name by Monsieur M. Cossman in his *Essais de Paleoonchologie Comparée Deux. Liv.*, p. 77, where he speaks of it as an aberrant form of this genus.

The present species differs from *P. septemlirata*, Harris, in general habit being a relatively broader form, with a shorter and more rapidly tapering spire, a longer aperture, shorter and broader canal, broader sinus, and finer sculpture. It is also



interesting to note that some of the Muddy Creek examples of this species show regular rusty oval rings and patches especially on the sutural band, and other rusty markings in conformity with the sinus at fairly regular intervals, apparently a remnant of original colour markings. I name this species with much pleasure after Mr. A. R. C. Selwyn, the first Government geologist of this colony.

**Variety *laevis*, var. nov.** (Pl. XIX., Fig. 2).

There is another form which I can only regard as a variety of the above, showing a marked tendency towards the almost entire suppression of the strong spiral threads or lirae, thus intensifying the general biconic aspect of the shell.

***Apiotoma bassi*, sp. nov.** (Pl. XIX., Fig. 11).

Description.—Shell fusiform, with a tapering spire less than half the length of the shell, a small but mammillate apex, whorls angulated by one strong keel, the base of the shell attenuated into a long, straight open canal, and a comparatively narrow aperture.

Embryo consisting of from one and a-half to two smooth whorls with the tip obliquely immersed, giving rise to the blunt mammillate appearance of the apex. Whorls number seven or eight, except in young specimens, strongly angulately keeled about the middle of each whorl or more usually a little above the middle of each whorl. On the earlier whorls the keel is bluntly nodulose; the nodules tend to become obsolete towards the body-whorl, where they are rarely present. The slope between the posterior suture and the keel is somewhat concave, intensifying the padoga-like appearance of the spire, suture well-defined and inclined to be margined. Surface of the shell covered with fine frequently interrupted spiral threads of unequal strength, crossed by stronger lines and undulations of growth, which frequently interfere with the regularity of the spiral threads. Sinus broad, moderately deep, and situated at the greatest concavity of the slope between the suture and the keel. Aperture long and rather narrow and gradually tapering

into the comparatively broad open canal. Outer lip thin and sharp at the edge, columella smooth, straight, slender, and tapering.

Dimensions.—Average specimens have a length of about 33 mm., by a breadth of 10 or 11 mm.; length of aperture and canal 20 mm.; greatest width of aperture, about 3.5 mm. Specimens on the large side range from about 45 to 50 mm. in length by a breadth of about 13 mm.; while small specimens range about 24 mm. in length by 8 mm. breadth.

Locality.—Common from the clays of the Cape Otway section, near Point Flinders.—Jan Jukian.—Eocene.

***Turbo hamiltonensis*, sp. nov.** (Pl. XIX., Fig. 4).

Description.—Shell turbinate, with a relatively elevated spire in the adult, elevation not striking in the young, robust and of medium size, consisting of about three convex whorls and a smooth embryo of about a whorl and a half, whorls ornate and strongly sculptured. Whorls convex, greatest convexity approximately medial, posterior slope to suture more gradual than anterior slope; suture well defined between the body and penultimate whorls, not ascending, the suture becomes less defined towards the embryo as the whorls overlap more, giving the young forms a more depressed appearance. Earlier whorls show three or four strong spiral threads on the upper or posterior slope, the one next to but usually the two next to the posterior suture showing a beaded coronation; this character is usually very indistinct or entirely absent from the remaining threads, and is continued right on to the body-whorl, where, however, it is not usually so clearly seen. The spiral threads number about seven or eight on the penultimate whorl, ten to greatest convexity on the body-whorl, varying in strength, some being rather broad flattened bands, the interspaces being narrow and deeply cut. Base of the shell bearing about ten strong threads which tend to become granulose near the umbilicus. Umbilicus small and rounded but deeply set. Aperture orbicular with the outer lip bevelled off from the interior to a sharp edge, posteriorly the inner lip is well defined by an enamel pad reaching to and into the umbilicus, anteriorly the columella end is somewhat patulous.

Dimensions.—Height, 34 mm. ; greatest diameter, 37 mm. ; diameter of aperture, 15 mm. ; diameter of umbilicus, 5 mm.

Locality.—Upper beds of the Grange Burn, near Hamilton, Western Victoria.—Kalimnan.—Miocene.

Observations.—This species shows a close relationship with our common living species, *Turbo undulatus*, Martyn, and might, on a casual examination, be mistaken for that species, but the more striking distinguishing features are in the sculpture, the beaded ornament near the suture, the strongly sculptured base, the smaller umbilicus, the stouter columella, and the more erect aspect.

***Collonia geelongensis*, sp. nov.** (Pl. XVIII., Figs. 8, 9).

Description.—Shell small, turbinate, and composed of about four slightly convex whorls. Apex blunt and depressed, with a smooth embryo. Suture distinct when not masked by one of the revolving keels.

Shell bearing four strong revolving keels or spiral threads on the earlier spire-whorls, these keels appear regularly beaded, the keels next the anterior and posterior sutures bearing slightly finer beads ; on the penultimate and body-whorls the grooves between the keels become deeper, and the keels strong, and the beading resolves itself under the lens into forwardly projecting frills. Interspaces and keels very finely lamellosely striate transverse to the keels. Base very slightly convex, distinctly but minutely umbilicate, and ornamented with about three keels of the same character as on the upper part of the body-whorl, occasionally a minute fourth keel may be detected within the umbilicus. Peristome complete, orbicular and contracted internally, wider externally owing to the strong bevelling off from the interior to the thin edge, this characteristic appearance of the aperture is much intensified by the decurrency of the posterior suture.

Dimensions.—Greatest diameter, 5 mm. ; height, 5 mm. ; external diameter of aperture, 2.5 mm. ; internal diameter of aperture, about 1 mm.

Locality.—Clays over Polyzoal Rock, Filter Quarries, Batesford, near Geelong.—Balcombian.—Eocene.

***Collonia otwayensis***, sp. nov. (Pl. XVIII., Fig. 6, 7).

Description.—Shell small, tumidly turbinate, rather solid, consisting of about five convex whorls with a blunt apex.

Whorls smooth to the unaided eye, but a lens shows fine regular spiral striae; whorls convex, suture faintly margined, earlier whorls more embracing than the body-whorl which runs down rapidly on the penultimate whorl with a more strongly defined suture. Base non-umbilicate, umbilical region margined by a faint ridge in the adult, which in more senile forms tends to break up into granules. Aperture roundly ovate, outer lip thickened, but bevelled off from the interior to a sharp outer edge. Columella slightly thickened and faintly effuse anteriorly, enamel of inner lip ascends to join the outer lip at the posterior extremity.

Dimensions.—Greatest diameter, 4 mm.; height, 4 mm.; diameter of aperture, 2 mm.; also specimens of height, 3 mm.; diameter, 3 mm.; and height 2.5 mm., by diameter 2 mm.

Locality.—Clays and sandy clays of the Cape Otway section near Point Flinders, and the Aire coastal section.—Jan Jukian.—Eocene.

***Cantharidus serratulus***, sp. nov. (Pl. XIX., Figs. 5, 6).

Description.—Shell of medium size, trochiform, of erect habit, acute spire, small apex, well impressed sutures, fine delicate ornament, and flat base.

Apex composed of a very small embryo of about a whorl and a half, the first whorl smooth and enrolled at right angles to the axis of general enrolment of the shell, and with the tip immersed, the remaining half-turn of the embryo is delicately costulate, thence the earlier clathrate sculpture of the spire prevails. Spire whorls eight, flat, or slightly convex between the sutures, the first three spire-whorls with a fine clathrate ornament owing to about three of the stronger spiral threads being crossed by numerous costulae of the same strength, with a slight beading or nodding at their intersections. The remaining spire-whorls bear from five to eight or nine fine granulose spiral threads of varying strength; in some specimens fair uniformity prevails, whilst in other examples some two or three

threads are distinctly stronger than the rest, the others being much finer and even then not of equal strength. In the coarser form the beads of the spiral threads tend to become spiny denticles when examined under a lens. A fairly strong thread usually forms a keel at the base; the base is flat and carries about twelve unequal very finely granulose spiral threads. Aperture quadrate, pearly within, outer lip thin, sharp, and finely crenulate in conformity with the spiral threads. Columella slightly twisted, giving rise at the anterior end to a tooth-like projection. Anterior of the aperture somewhat profuse at the columella side.

Dimensions.—Height, 15 to 17.5 mm.; breadth, 9.5 to 12 mm.; height of aperture, 3.5 to 5 mm.; breadth of aperture, 5 to 6 mm. Also 12 mm. in length by 8.5 mm. in breadth and 10.5 by 7, 9 by 7, 7 by 5, and 6 by 4 for the same relative measurements in smaller specimens.

Locality.—Lower beds of Muddy Creek, near Hamilton, Western Victoria; clays of the Old Cement Works, Balcombe's Bay, Mornington.—Balcombian.—Eocene.

***Astele millegranosa*, sp. nov. (Pl. XIX., Figs. 7, 8).**

Description.—Shell trochiform, rather thin and fragile, composed of eight or nine spire-whorls and about one and a half smooth embryonic whorls.

Spire-whorls usually flattened, but occasionally slightly concave in the earlier portion of the spire, in which case the aspect of the shell is somewhat altered in the direction of giving a broader and more squat form. Spire-whorls bearing fine spiral threads increasing from about three to eleven or twelve on the body-whorl, the basal thread of each whorl being the strongest, forms a well-marked girdle, the remaining threads varying in strength; each thread is furnished with a fine beaded ornament, the size of the beads varying with the strength of the threads, the interspaces between the threads bearing fine oblique striae of growth. The ornament on the earlier spire-whorls is beautifully fine, and has a distinctly clathrate appearance owing to the spiral threads being crossed transversely by slightly oblique striae, with only slight nodding for the first three or four whorls; then the nodding strengthens and develops into beads, and finally

tends towards spiny elevations on the spiral threads under the lens. The granose ornament tends to become obsolete on the flattened (in young specimens), to slightly convex base (in adult specimens), but the young shells show several of the spiral threads in the neighbourhood of the umbilicus with a fine beaded sculpture. The base of the adult shows about fourteen or fifteen spiral threads, somewhat unequal, with an occasional fine intercalated thread near the periphery; this spiral sculpture is crossed by sigmoidal lines of growth radiating from the umbilicus. Base furnished with a wide and very profound umbilicus extending nearly up to the embryonic whorls; margin of umbilicus furnished with a comparatively broad crenulated band, while the whole interior bears beaded spiral threads of unequal strength. Aperture quadrate, outer lip and inner lip both thin and slightly crenulate in conformity with the spiral threads.

Dimensions.—Height, 23 mm.; greatest diameter, 29 mm., height of aperture, 7 mm.; breadth of aperture, 9 mm.; diameter of umbilicus from margin to posterior of aperture, 9 mm. More erect young forms, height, 18 mm.; diameter at the base, 19 mm.; also 12 mm. by 10.5 mm.; 10 mm. by 10 mm., and 8 mm. by 8 mm.

Locality.—Lower beds of Muddy Creek, near Hamilton, Western Victoria.—Balcombian.—Eocene.

Observations.—This is apparently the forerunner of our living *Astele subcarinata*, Swainson, but it may be very readily separated, and it may also be noted that it is the squat adult form which appears to develop the greatest affinity.

### ***Eutrochus fontinalis*, sp. nov. (Pl. XIX., Fig. 9).**

Description.—This, though a smaller shell, is closely related in many of its characters to the foregoing species, but differs in its more slender form, its fewer and less regular spiral threads, slightly coarser ornament, narrower and more circular base bearing broader flattened spiral bands with obscure beading, comparatively narrow and shallow umbilicus margined by at least three distinct beaded spirals, and robust columella.

Dimensions.—Height, 15 mm.; diameter of base, 13 mm., height of aperture, 4 mm.; breadth of aperture, 5 mm.; diameter of umbilicus barely 2 mm. Smaller specimens down to height 6 mm., diameter of base 5 mm.

Locality.—Lower beds of Spring Creek series or Bird Rock Bluff, near Geelong.—Jan Jukian.—Eocene.

Observations.—The most striking features to distinguish this form from the foregoing are in the umbilical characters, which do not admit of any hesitation in making the separation.

**Bankivia howitti**, sp. nov. (Pl. XVIII., Fig. 1).

Description.—Shell large, subulate, with a rather broad base, and consisting of about six smooth, flattened spire-whorls, and about two depressed embryonic whorls of a somewhat convex aspect. The shell, though rapidly tapering as a whole, is somewhat blunted at the apex by the depression of the small embryonic whorls; the general apical angle ranges from thirty to forty degrees, but the taper is not uniform, the spire taper averaging thirty to thirty-five degrees, but near the apex it falls away much more rapidly.

Whorls flat and only showing oblique lines of growth, except the body-whorl which shows faint spiral lines increasing in strength and number towards the base, about ten or twelve fairly strong spiral ridges showing at the base, suture slightly impressed, the later whorls developing a comparatively broad and strong sutural band, being on the penultimate whorl about one-fifth the height of the whorl. Aperture subovate, outer lip thin; columella short, twisted, and truncated at the base.

Dimensions.—Type, length, 27 mm.; greatest breadth, 12 mm.; height of aperture, 9 mm.; breadth of aperture, 5 mm. Smaller examples down to length, 19 mm.; breadth, 9; and length, 15 mm.; breadth, 7 mm.

An extra fine and large specimen is in the National Museum collection, Melbourne, and was presented by Mr. A. W. Howitt, and the dimensions of it have been kindly given to me by Mr. F. Chapman, as—length, 35 mm.; greatest breadth, 13.5 mm.; width of aperture, 6 mm.

Locality.—Sandy clays of Jimmy's Point, Gippsland.—Kallinman.—Miocene.

Observations.—This species can at once be distinguished from our living *B. fasciata* by its more robust habit and striking sutural band amongst other features. It affords me much pleasure to name this species after Mr. A. W. Howitt, by whom it was collected many years ago during the carrying out of his

geological work in Gippsland, and several specimens of this species were presented by him to the National Museum collection, Melbourne. This species has appeared in some of our local lists of fossils under the manuscript name of *Bankivia maxima*, and attributed to Tate as author, but the above name will now replace it.

***Pleurotoma murrayana*, sp. nov.** (Pl. XIX., Fig. 10).

Description.—Shell small to medium size with a rather blunt apex, slender elongate spire, and a body-whorl shorter than the spire.

Embryo consisting of about two whorls and a half, blunt apically, smooth and inclined to be angled medially after about the first half-turn; this portion is also rather more tumid and protrudes over the remainder of the embryonic whorls, spire whorls seven, rather flat to slightly convex between the channelled sutures owing to the marked overlap of the whorls. Whorls strongly nodosely keeled about the middle of each whorl and forming a well-marked shoulder on the body-whorl, also bearing spiral threads, usually two well-developed ones below the keel on each spire whorl with finer intercalated threads, and fine threads above the keel on the slope of the posterior suture. The body-whorl shows four strong spiral threads on the anterior slope in front of the keel, with finer threads of two degrees in the interspaces, and thence to the end of the snout spirally striate. The spiral sculpture is crossed by striae and undulations parallel to the lines of growth giving rise to a clathrate appearance on the slope towards the posterior suture. The keel marks the position of the sinus and is very regularly and acutely nodulose, nodules about eighteen to twenty on the penultimate and body-whorls. Aperture ovate, extending into a comparatively broad, straight canal of only moderate length. Outer lip thin and sharp, with a broad, deep sinus at the shoulder, thence ascending with a fair overlap on the penultimate whorl. Columella smooth, straight, and rapidly tapering.

Dimensions.—Length, 28 mm.; breadth of penultimate-whorl, 8 mm.; breadth of body-whorl, 9 mm.; length of aperture and canal, 12 mm.; breadth of aperture, 3 mm. Smaller specimens of length, 21 mm.; breadth, 7 mm.



Locality.—River Murray Cliffs, near Morgan.—Barwonian.—Eocene.

*Pleurotoma granti*, sp. nov. (Pl. XIX., Fig. 3).

Description.—Shell large, very graceful and elongate fusiform; with a slender tapering spire less than half the total length of the shell, and a long straight canal.

Spire very acute, the general apical angle being only about twenty-two or twenty-three degrees, extreme apex bluntly rounded. Embryo composed of about two and a half smooth, slightly convex whorls. The remainder of the shell is composed of nine regularly convex whorls, greatest convexity about the middle of each whorl, suture impressed, but as the whorls distinctly overlap the greatest impression or concavity is a little below the suture. Whorls spirally lirate and striate, three or four threads usually being more strongly developed than the rest about the middle of each whorl, seven or eight threads being more thoroughly visible on the body-whorl, the remainder of the surface of the shell being very finely and regularly spirally striate. Transverse striae of growth usually very faint on the spire whorls, a little more distinct on the body-whorl, but distinctly subordinate to the spiral sculpture. Sinus broad and deep, and situated in the concavity between the suture and greatest convexity of the whorls, but nearer to the former. Aperture elongate-oval, extending into a long, straight, and comparatively broad canal; outer lip thin; inner lip well defined by a thin layer of enamel spread out over the columella and strongly margined off from the spiral sculpture, the margin extending down the full length of the long, straight, tapering columella.

Dimensions.—Length, 63 mm.; breadth, 13 mm.; length of aperture and canal, 31 mm.; length of aperture, about 12 mm.; breadth of aperture, about 5 mm.

Locality.—Lower beds of Muddy Creek, near Hamilton. Western Victoria.—Balcombian.—Eocene.

Observations.—I have much pleasure in naming this graceful shell after my friend, Mr. F. E. Grant, who has done a considerable amount of work on our Tertiaries, and is always ready and willing to help others in their work in any way he can.

